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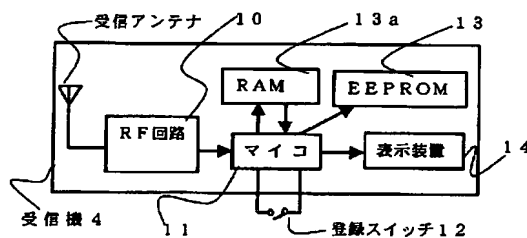
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(54) 【発明の名称】 タイヤ空気圧監視システム

(57) 【要約】

【課題】 タイヤ空気圧監視システムにおいて、ID登録を受信機側の簡単な操作と、圧力を変化させることによる強制送信により、車両の各タイヤの送信機IDを学習することにある。

【解決原理】 受信機の登録スイッチのON期間に受信したIDを、その受信機において、認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶することを特徴としたタイヤ空気圧監視システムである。



【図3】

【特許請求の範囲】

【請求項1】電池を電源として利用し、圧力を計測する圧力センサと、圧力センサに一定間隔で圧力の計測指示を出すマイコンと、固有のID番号を生成する固有ID生成素子と、圧力センサで計測された圧力データを送信波形に変換する送信回路と、送信回路で変換された送信波形を外部に送信する送信アンテナで構成された送信機を、車両のそれぞれのタイヤ内部に取り付けることにより、車両が走行中にタイヤ内部の圧力データを定期的に送信する送信機と、前記送信機から送信されたデータを受信する受信アンテナと、受信した信号をデジタル信号に変換するRF回路と、RF回路で変換されたデジタル信号を解析して受信ID番号と圧力データを認識するマイコンと、受信したIDを受信機に登録するための登録スイッチと、登録するIDを一時的に格納するRAMと、RAMに格納されたID番号を恒久的に格納するEEPROMと、受信したデータの認識内容を表示する表示装置で構成された受信機を、車両の運転席付近に設置して、各車両のタイヤ内部の空気圧を監視することを目的としたタイヤ空気圧監視システムにおいて受信機の登録スイッチのON期間に受信したIDを、その受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶することを特徴としたタイヤ空気圧監視システム。

【請求項2】送信機内部の圧力センサにより定期的に計測される圧力データが、直前に測定された圧力データと比較して所定の圧力差を生じた場合に、送信データ中の特定の1ビット（以下にベアリングビットと称する）を0から1に変化させてデータを送信することで、圧力変化による送信であることを受信機が認識できることを特徴とした請求項1に述べるタイヤ空気圧監視システム。

【請求項3】請求項1に述べる受信機において、その受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶する条件として、受信機の登録スイッチのON期間に受信したIDという条件に、さらにその受信データの中のベアリングビットが1である場合という条件を追加することにより、任意の送信機のID登録ができることを特徴とした請求項2に述べるタイヤ空気圧監視システム。

【請求項4】請求項1に述べる受信機の登録スイッチがONのときに、登録しようとしているID格納位置を表示装置に表示することにより、ID格納位置とそのID格納位置に登録されている送信機がどのタイヤに装着されているかが判定できることを特徴とした請求項3に述べるタイヤ空気圧監視システム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、タイヤ空気圧監視システムにおける送信機のID登録に関する。

【0002】

【従来の技術】タイヤ空気圧を検出する圧力スイッチと、この圧力スイッチにより変化する電磁的な共振回路とをタイヤ側に設け、この共振回路の共振状態を車体側に設けた装置から無線により検出するタイヤ空気圧検出装置などが今までに提案されている。そして、これらタイヤ圧力のモニタ結果、圧力スイッチの状態はあらかじめ決められたそれぞれ個別のID番号を、車内に設置されている受信機に登録させることで、必要とするタイヤの圧力情報を判定材料としている。

【0003】このため、ID登録作業は非常に重要であり、その方法として、受信機側にあらかじめ受信可能なID番号を登録したり、特開平8-505939号公報で提案されている磁石を送信機近傍に近づける方法などで、強制送信させて、受信機側でID登録をさせていた。また、特開平9-210827号公報では、タイヤ空気圧警報装置の送信機IDを学習し、自動的に登録IDを更新する方法が提案されている。

【0004】これらの従来技術は、いずれも走行中のタイヤ空気圧を無線信号により監視して、タイヤ空気圧の減少を早めに捉えて運転席に警報を送出することができる優れた思想である。ただし、問題点は自動車の製造ラインの上で一貫した製造組立および検査を行う場合、自動車にタイヤ空気圧警報装置を装備すると、検査工程が複雑になるところにある。すなわち、受信機側での受信可能IDをあらかじめ決めてしまうと、受信機にあわせて、送信機装着工程を準備しなくてはならず、作業工数増大によるコストアップとなってしまう。

【0005】また、磁石を送信機近傍に近づける方法により、送信機からの強制送信を可能とし、受信機側でIDの再登録を可能にする方法は、送信機の内部に磁石に反応するための素子回路を設けなくてはならず、送信機のコストアップ要因となる。さらにこの構成は、強制送信させるための磁石を必要とする。

【0006】また、特開平9-210827号公報での送信機IDの学習機能は、EEPROMに登録されている送信機IDのうち受信できなくなった送信機IDを、ほかの送信機IDに交換できるように提案されているが、この方法の場合には単に一定期間受信できなくなっただけで、登録IDをそれまでに受信したほかのIDと交換してしまうために、車両の走行中フェージング等の外部影響による受信異常の場合にも、簡単にほかのIDと交換してしまう危険性があった。

【0007】

【発明が解決しようとする課題】従って、本発明の目的は、タイヤ空気圧監視システムにおいて、ID登録を受信機側の簡単な操作と、圧力を変化させることによる強制送信により、特別な回路を送信機に設けることなく、また特別のツールを用いなくとも車両の各タイヤの送信機IDを学習することにある。

【0008】

【課題を解決するための手段】電池を電源として利用し、圧力を計測する圧力センサと、圧力センサに一定間隔で圧力の計測指示を出すマイコンと、固有のID番号を生成する固有ID生成素子と、圧力センサで計測された圧力データを送信波形に変換する送信回路と、送信回路で変換された送信波形を外部に送信する送信アンテナで構成された送信機を、車両のそれぞれのタイヤ内部に取り付けることにより、車両が走行中にタイヤ内部の圧力データを定期的に送信する送信機と、前記送信機から送信されたデータを受信する受信アンテナと、受信した信号をデジタル信号に変換するRF回路と、RF回路で変換されたデジタル信号を解析して受信ID番号と圧力データを認識するマイコンと、受信したIDを受信機に登録するための登録スイッチと、登録するIDを一時的に格納するRAMと、RAMに格納されたID番号を恒久的に格納するEEPROMと、受信したデータの認識内容を表示する表示装置で構成された受信機を、車両の運転席付近に設置して、各車両のタイヤ内部の空気圧を監視することを目的としたタイヤ空気圧監視システムにおいて、受信機の登録スイッチのON期間に受信したIDを、その受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶するようにし、送信機内部の圧力センサにより定期的に計測される圧力データが、直前に測定された圧力データと比較して所定の圧力差を生じた場合に、ベアリングビットを0から1に変化させてデータを送信することで、圧力変化による送信であることを受信機が認識できるようにし、その受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶する条件として、受信機の登録スイッチのON期間に受信したIDという条件に、さらにその受信データの中のベアリングビットが1である場合という条件を追加することにより、任意の送信機のID登録ができるようにし、さらには受信機の登録スイッチがONのときに、登録しようとしているID格納位置を表示装置に表示することにより、ID格納位置とそのID格納位置に登録されている送信機がどのタイヤに装着されているかが判定できるようにすることで、問題点の解決手段とするものである。

【0009】

【発明の実施の形態】図1に本発明のタイヤ空気圧監視システムの構成を示す。図2に本発明のタイヤ空気圧監視システム用送信機の構成図を示す。図3に本発明のタイヤ空気圧監視システム用受信機の構成図を示す。図4に本発明の送信データの構成を示す。以下、本発明の実施例の形態を図示例と共に説明する。図1において、車両1には4つのタイヤ2を有し、各々のタイヤ2の内部にはタイヤ2の内部圧力を受けて圧力に関連した情報を搬送する無線信号を送信する送信機3が設けられている。各送信機3は、送信データの源を検証するための送信機3にもそれぞれ固有で唯一の識別コード(ID)

を有する。送信された信号は、車両1の運転者から見える範囲の位置に設置されている受信機4に受信されて、処理される。

【0010】図2において、送信機3内部のマイコン5は一定期間ごとに、圧力計測指示を圧力センサ6に送り、圧力センサ6から圧力データを入手する。その一定間隔の計測を所定の回数おこなった後、その時に計測された圧力データと固有ID生成素子6aで生成された24ビットの固有IDを送信回路7に出力し、送信回路7にて送信信号に変換し、送信アンテナ8を経由して受信機へ送信する。これは通常定期送信と呼ばれる。また、圧力計測結果が前回と比較して所定圧力以上の変化が発生した場合には、圧力異常として、直ちに圧力データを送信する。この時に、送信データの中に含まれるベアリングビットを0から1にして送信する。これは異常送信と呼ばれる。

【0011】図3において、受信機4の受信アンテナ9から電波を受信し、受信した信号をRF回路10でデジタル信号に変換し、変換されたデジタル信号をマイコン11で解読する。このとき解読されたデータの中に含まれているIDコードをEEPROM13に格納されている登録IDと比較して、登録されているIDと同一であれば受信したデータを認識データとして所定の処理をする。そして、処理の内容結果を表示装置14に表示する。その内容は例えば受信したデータの中に含まれている圧力データなどさまざまである。

【0012】受信機4の、登録スイッチ12をONにすることで、受信機4はID登録モードと称して、受信したIDをEEPROM13に書き込みをするためのモードとなる。図4に送信機からの送信データの一例を示す。ここで、IDコードは24ビット長としているが、32ビット長としてもよい。また圧力データの直後の1ビットをベアリングビットとしているが、その位置は送信データのサムチェック以前に位置していればどこであっても本発明には影響を与えない。

【0013】

【発明の実施例】次に、本発明におけるタイヤ空気圧監視システムの登録制御について説明する。受信機にID登録を行なう時に、まず作業者は図3における受信機4の登録スイッチ12をON側にする。この状態で、受信機4はID登録モードとなり、表示装置14はRAM13aのID格納位置を表示する。ID格納位置は1から登録できるID数まで設定され、表示装置に表示されるID格納位置も1から順に更新される。RAM13aにはID格納領域が設定してあり、通常は(1個IDのバイト数)×(登録IDの数)バイト分の領域がRAM13aの中に設定される。

【0014】次に作業者は登録しようとするタイヤの空気弁の軸部を押すことによりタイヤ内部の空気を抜き圧力を変化させる。この操作により、このタイヤ内部に装

着されている送信機は圧力変化がタイヤ内部に生じていることを検出するので、その時点で送信機は直ちに異常送信として受信機にデータを送信する。このとき、異常送信であるために送信データに含まれるベアリングビットは1にして送信されることになる。

【0015】前記の異常送信によりベアリングビットが1として設定されたデータを受信機4が受信すると、受信機4は表示装置14に表示されているID格納位置(RAM13aの内部)に受信したID番号を一時的に格納する。そして、次のID格納位置を表示装置14に表示して、次の送信機からのデータを待つ。乗用車の場合には、通常タイヤは4つ装着されているので、受信機4に必要な登録IDの数も4つである。したがって、作業者は表示装置14に表示されるID格納位置が1、2、3、4と順に更新されるまでに登録する順序、例えば左側前輪、左側後輪、右側前輪、右側後輪等の順序で、各タイヤのバルブコアを押して、タイヤ内部の空気圧力を変化させ登録することが可能である。4輪すべての受信を完了すると表示は5(END)になり、この時点でRAM13aに格納してあるそれまでの受信ID番号を同じ領域が確保してあるEEPROM13に書き込みを行ない、登録を完了する。

【0016】4輪の受信を完了した時点で、EEPROMに書き込む理由は、登録作業途中(つまり4輪の受信が完了していない時)で、作業者が登録スイッチをOFFにした場合には、それまでの登録作業をクリアするためである。次に図5のフローチャートを利用して、登録制御(S1)の流れを説明する。受信機4がデータを受信すると、まず登録スイッチ12がON側かどうかの判定を行なう(S2)。そしてOFF側であれば登録モードではないのでID格納位置を1に初期設定して制御を抜ける(S11)。

【0017】登録スイッチ12がON側であれば登録モードなので現在のID格納位置が5になっていないかの判定を行なう(S4)。ID格納位置が5になっていれば既に4輪のデータ受信を完了しており、EEPROMへの登録も完了しているので、そのまま制御を抜ける(S11)。ID格納位置が4以下であれば、登録モードになってから未受信の送信機があると予想されるので受信したデータのベアリングビットが1であるか判定する(S5)。ベアリングビットが1であれば異常送信されたデータであるためID番号をRAM13aに格納する必要がある。

【0018】しかし、既に格納してあるID番号が存在すると2重格納となるので、ここで受信したID番号がRAM13aに格納済みのデータかどうかの判定をする(S6)。そして、既に格納済みのID番号であれば格納せずに制御を抜ける(S11)。同一のID番号がRAM13aに格納されていないければ受信したID番号をその時点でのID格納位置に格納する(S7)。そして

次のID格納位置を示すためにID格納位置をインクリメントする(S8)。

【0019】その結果、ID格納位置が5となった場合には4輪のタイヤのそれぞれに装着されている送信機からのデータを受信したことになるので、RAM13aに格納されている4種類のID番号をEEPROM13へ書き込む(S10)。EEPROM13は不揮発性メモリなので受信機4の電源が遮断されても保存されている内容は消去されることはない。このEEPROM13に登録されたIDは登録IDとよばれ、登録作業はこの受信機4が認識するID番号を決定する重要な作業である。受信機4は、ここで登録されたIDのみしか認識しない。ほかのIDを受信しても、無視するように構成されている。

【0020】登録するIDの数は通常の乗用車の場合、4つのタイヤ2を有しているので、EEPROM13に登録できるIDの数も4つである。4つのIDに登録した時点で、EEPROM13にIDが書き込まれ、作業者が受信機4の登録スイッチ12をOFFにすることで登録作業は完了する。登録作業中は前記したようにID格納位置が受信機4に接続されている表示装置14にその番号が表示され、登録作業中に現在のID格納位置を視覚的に示す事ができる。

【0021】

【発明の効果】以上のように本発明によれば、受信機の登録スイッチのON期間に受信したIDを、その受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶するようにすることで、ID登録の作業が受信機の簡単な操作設定によりID登録モードとすることができる。また送信機内部の圧力センサにより定期的に計測される圧力データが、直前に測定された圧力データと比較して所定の圧力差を生じた場合に、ベアリングビットを0から1に変化させてデータを送信することで、圧力変化による送信であることを受信機が認識できるようにし、送信機側に特別な回路を追加することなく、また磁石などの特別なツールを必要とせず強制送信を行なわせることができる。また、受信機側でも受信したデータが通常送信されたデータか、異常送信されたデータかの判断ができる。さらには受信機において認識すべき送信機のIDとして受信機の内部に持っているEEPROMに記憶する条件として、受信機の登録スイッチのON期間に受信したデータIDという条件に、さらにそのデータの中のベアリングビットが1である場合という条件を追加することにより、任意の送信機のID登録ができ、登録モード中に通常送信で送信されてきたデータを受信しても登録されてしまう事態を解消することができる。また個別タイヤの登録作業の確認が登録作業員自身で行なえる。さらには受信機の登録スイッチがONのときに、登録しようとしているID登録位置を表示装置に表示することにより、ID登録位置と

そのID登録位置に登録されている送信機がどのタイヤに装着されているかが判定できる。即ち、どのタイヤに装着されている送信機のID番号が何番目のIDとして受信機に登録されたかがわかる。このように、本発明の実用性は非常に大きい。

【図面の簡単な説明】

【図1】本発明のタイヤ空気圧監視システムの構成を示す。

【図2】本発明のタイヤ空気圧監視システムの送信機構成図を示す。

【図3】本発明のタイヤ空気圧監視システムの受信機構成図を示す。

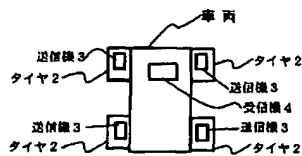
*【図4】本発明の送信データの構成を示す。

【図5】本発明の登録制御の制御フロー図を示す。

【符号の簡単な説明】

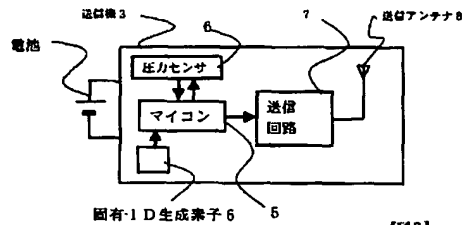
- 1 車両
- 3 送信機
- 4 受信機
- 5 マイコン
- 11 マイコン
- 12 登録スイッチ
- 10 13 EEPROM
- 13 a RAM
- * 14 表示装置

【図1】



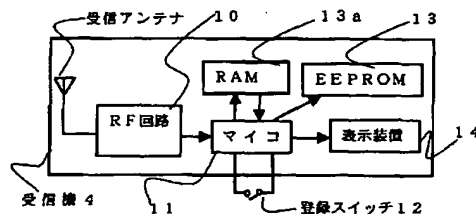
【図1】

【図2】



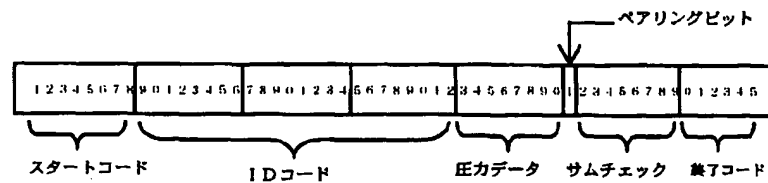
【図2】

【図3】



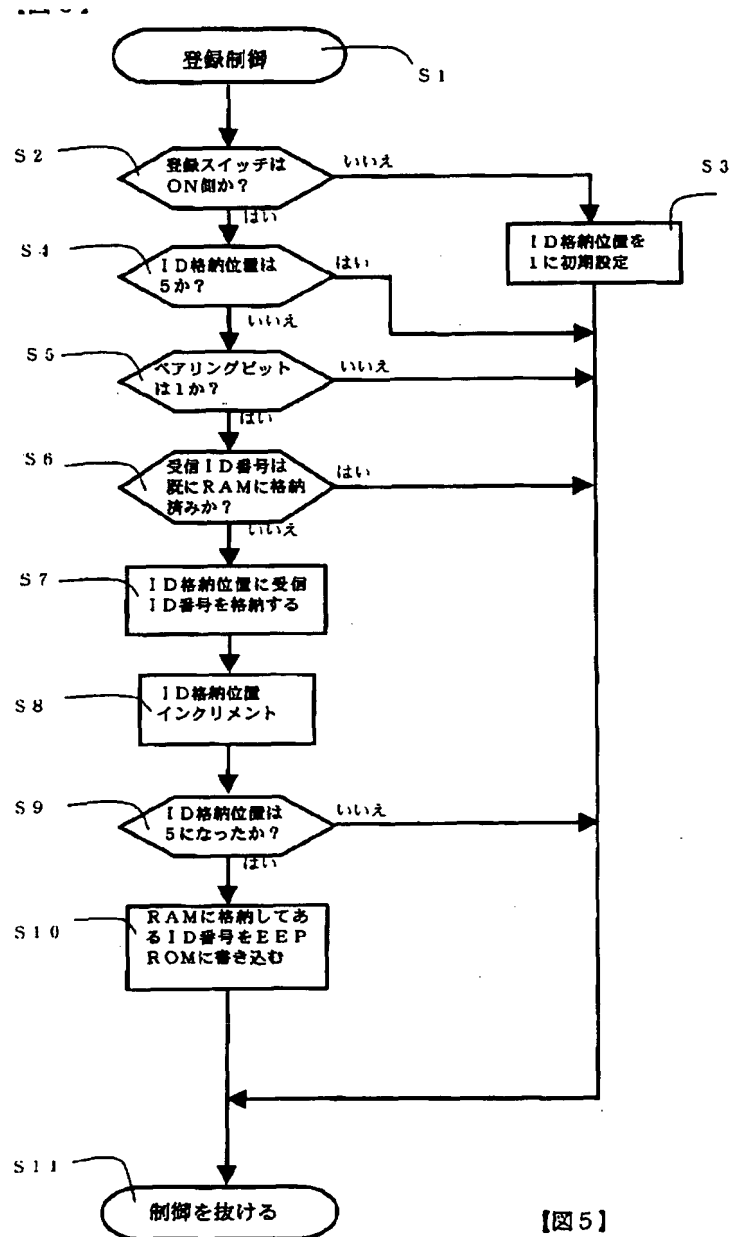
【図3】

【図4】



【図4】

【図5】



【図5】

PATENT ABSTRACTS OF JAPAN

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(21)Application number : 10-274775 (71)Applicant : PACIFIC IND CO LTD

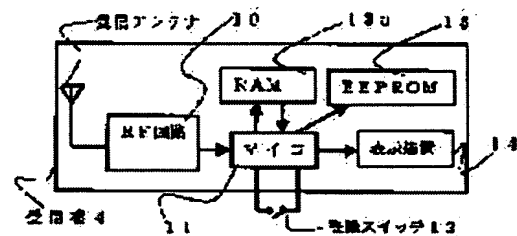
(22)Date of filing : 29.09.1998 (72)Inventor : IMAO NOBORU
SAEKI SETSUHIRO

(54) TIRE INFLATION PRESSURE SUPERVISORY SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To execute the ID registration by the simple operation at a receiver side by storing ID received during an ON-period of a registering switch of a receiver in EEPROM inside of the receiver as ID of a transmitter to be recognized in the receiver.

SOLUTION: An ID registering mode for writing ID received by a receiver 4 to EEPROM 13 is obtained by turning on a registering switch 12 of the receiver 4. On the other hand, at a transmitter s



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CLAIMS

[Claim(s)]

[Claim 1] The pressure sensor which uses a cell as a power supply and measures a pressure, and the microcomputer which takes out measurement directions of a pressure with a fixed interval to a pressure sensor, The peculiar ID generator which generates a peculiar identification number, and the sending circuit which changes into a transmission-wave form the pressure data measured by the pressure sensor, By attaching in the interior of each tire of vehicles the transmitter which consisted of transmitting antennas which transmit outside the transmission-wave form changed by the sending circuit The transmitter which transmits the pressure data inside a tire periodically while vehicles run, The receiving antenna which receives the data transmitted from the aforementioned transmitter, and RF circuit which changes the received signal into a digital signal, The microcomputer which analyzes the digital signal changed in RF circuit, and recognizes a receiving identification number and pressure data, The registration switch for registering ID which received into a receiver, and RAM which stores ID to register temporarily, The receiver which consisted of an EEPROM which stores everlastingly the identification number stored in RAM, and display which displays the content of recognition of the received data is installed near the driver's seat of vehicles. ID which received during the ON of the registration switch of a receiver in the tire-pressure monitoring system aiming at supervising the pneumatic pressure inside the tire of each vehicles Tire-pressure monitoring system characterized by what is memorized to EEPROM which it has in the interior of a receiver as ID of the transmitter which should be recognized in the receiver.

[Claim 2] Tire-pressure monitoring system stated to the claim 1 characterized by the ability of a receiver to recognize that it is transmission by pressure variation by changing specific 1 bit in transmit data (a pairing bit being called below) to 1 from 0, and transmitting data when the pressure data periodically measured by the pressure sensor inside a transmitter produce a predetermined pressure differential as compared with the pressure data measured immediately before.

[Claim 3] As conditions memorized to EEPROM which it has in the interior of a receiver in the receiver stated to a claim 1 as ID of the transmitter which should be recognized in the receiver Tire-pressure monitoring system stated to the claim 2 characterized by the ability to perform ID registration of arbitrary transmitters by adding the conditions of the case where the pairing bit in the received data is 1 further to the conditions of ID which received during the ON of the registration switch of a receiver.

[Claim 4] Tire-pressure monitoring system stated to the claim 3 characterized by what which tire is equipped with the transmitter registered into ID storing position and its ID storing position by displaying ID storing position which it is going to register on display when the registration switch of the receiver stated to a claim 1 is ON can judge.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to ID registration of the transmitter in tire-pressure monitoring system.

[0002]

[Description of the Prior Art] the electromagnetism which changes with the pressure switch which detects a tire pressure, and these pressure switches -- the tire-pressure detection equipment detected by radio is proposed until now from the equipment which prepared the resonance circuit [-like] in the tire side, and prepared the resonance state of this resonance circuit in the body side And the monitor result of these inflation pressure force and the state of a pressure switch make judgment material the pressure information on the tire which is each making an individual identification number register into the receiver currently installed in in the car, and is needed decided beforehand.

[0003] For this reason, it is very important and ID registration work is in registering into a receiver side the identification number which can receive beforehand as the method ****. It is the method of bringing close the magnet proposed by JP,8-505939,A near the transmitter etc., forcible transmission was carried out, and ID registration was carried out by the receiver side. Moreover, in JP,9-210827,A, the transmitter ID of a tire-pressure alarm is learned and the method of updating Registration ID automatically is proposed.

[0004] Each of such conventional technology is the outstanding thought which can supervise the tire pressure under run by the radio signal, can catch reduction in a tire pressure a little early, and can send out an alarm to a driver's seat. However, a trouble is in the place where an inspection process becomes complicated, when conducting the manufacture assembly and inspection which were consistent on the production line of an automobile and an automobile is equipped with a tire-pressure alarm. That is, if the ready-for-receiving ability ID by the side of a receiver is decided beforehand, in accordance with a receiver, a transmitter wearing process will have to be prepared and it will become the cost rise by work man day increase.

[0005] Moreover, the method of enabling compulsive transmission from a transmitter and enabling re-registration of ID by the receiver side by the method of bringing a magnet close near the transmitter, must establish the element circuit for reacting to a magnet in the interior of a transmitter, and becomes the cost rise factor of a transmitter. Furthermore, this composition needs the magnet for carrying out forcible transmission.

[0006] Moreover, although the learning function of the transmitter ID in JP,9-210827,A is proposed that the transmitter ID it became impossible to receive among the transmitters ID registered into EEPROM is exchangeable for other transmitters ID In order to exchange for other ID which received Registration ID by then only by it becoming impossible to receive during a fixed period in the case of this method, also in the case of the receiving abnormalities under the external influences of phasing in a rolling stock run etc., there was a danger of exchanging for other ID simply.

[0007]

[Problem(s) to be Solved by the Invention] Therefore, in tire-pressure monitoring system, even if a special tool is not used for the purpose of this invention by compulsive transmission by ID registration changing a pressure with the easy operation by the side of a receiver, without establishing a special circuit in a transmitter, it is to learn the transmitter ID of each tire of vehicles.

[0008]

[Means for Solving the Problem] The pressure sensor which uses a cell as a power supply and measures a pressure, and the microcomputer which takes out measurement directions of a pressure with a fixed interval to a pressure sensor, The peculiar ID generator child who generates a peculiar identification number, and the sending circuit which changes into a transmission-wave form the pressure data measured by the pressure sensor, By attaching in the interior of each tire of vehicles the transmitter which consisted of transmitting antennas which transmit outside the transmission-wave form changed by the sending circuit The transmitter which transmits the pressure data inside a tire periodically while vehicles run, The receiving antenna which receives the data transmitted from the aforementioned transmitter, and RF circuit which changes the received signal into a digital signal, The microcomputer which analyzes the digital signal changed in RF circuit, and recognizes a receiving identification number and pressure data, The registration switch for registering ID which received into a receiver, and RAM which stores ID to register temporarily, The receiver which consisted of an EEPROM which stores everlastingly the identification number stored in RAM, and display which displays the content of recognition of the received data is installed near the driver's seat of vehicles. In the tire-pressure monitoring system aiming at supervising the pneumatic pressure inside the tire of each vehicles It is made to memorize to EEPROM which it has in the interior of a receiver as ID of a transmitter which should recognize ID which received during the ON of the registration switch of a receiver in the receiver. By changing a pairing bit to 1 from 0, and transmitting data, when the pressure data periodically measured by the pressure sensor inside a transmitter produce a predetermined pressure differential as compared with the pressure data measured immediately before As conditions memorized to EEPROM which has that it is transmission by pressure variation in the interior of a receiver as ID of the transmitter which enables it to recognize a receiver and should be recognized in the receiver By adding the conditions of the case where the pairing bit in the received data is 1 further to the conditions of ID which received during the ON of the registration switch of a receiver Can be made to perform ID registration of arbitrary transmitters, and when the registration switch of a receiver is ON further Let it be the solution means of a trouble which tire to equip with the transmitter registered into ID storing position and its ID storing position by enabling it to judge by displaying ID storing position which it is going to register on display.

[0009]

[Embodiments of the Invention] The composition of the tire-pressure monitoring system of this invention is shown in drawing 1 . The block diagram of the transmitter for tire-pressure monitoring system of this invention is shown in drawing 2 . The block diagram of the receiver for tire-pressure monitoring system of this invention is shown in drawing 3 . The composition of the transmit data of this invention is shown in drawing 4 . Hereafter, the gestalt of the example of this invention is explained with the example of illustration. In drawing 1 , on vehicles 1, it has four tires 2, and the transmitter 3 which transmits the radio signal which conveys the information relevant to the pressure in response to the internal pressure of a tire 2 is formed in the interior of each tire 2. Each transmitter 3 has the only identification code (ID) respectively peculiar to every transmitter 3 in order to verify the source of transmit data. The transmitted signal is received and processed by the receiver 4 currently installed in the position of the range which is in sight from the operator of vehicles 1.

[0010] In drawing 2 , for every fixed period, the microcomputer 5 of the transmitter 3 interior sends pressure measurement directions to a pressure sensor 6, and receives pressure data from a pressure sensor 6. After measuring the predetermined number of the fixed intervals, 24-bit peculiar ID generated by the pressure data and peculiar ID generator child 6a which were then measured is outputted to a sending circuit 7, and it changes into a sending signal by the sending circuit 7, and transmits to a receiver via the transmitting antenna 8. This is usually called fixed transmission. Moreover, a pressure

measurement result transmits pressure data immediately as a pressure being unusual, when the change more than a predetermined pressure occurs as compared with last time. At this time, the pairing bit contained in transmit data is set to 1 from 0, and it transmits. This is called unusual transmission.

[0011] In drawing 3, an electric wave is received, the received signal is changed into a digital signal from the receiving antenna 9 of a receiver 4 in the RF circuit 10, and the changed digital signal is decoded with a microcomputer 11. Predetermined processing is carried out by using the data received when the same as that of ID registered as compared with the registration ID in which the ID cord contained in the data decoded at this time is stored by EEPROM13 as recognition data. And the content result of processing is displayed on display 14. The pressure data of the content contained in the data received, for example are various.

[0012] It becomes the mode for calling a receiver 4 ID registration mode and writing ID which received in EEPROM13 by turning ON the registration switch 12 of a receiver 4. An example of the transmit data from a transmitter is shown in drawing 4. Here, although the ID cord is considering as 24 bit length, it is good also as 32 bit length. Moreover, although 1 bit just behind pressure data is made into the pairing bit, if located before the sum check of transmit data, even if the position is where, it does not affect this invention.

[0013]

[Example] Next, registration control of the tire-pressure monitoring system in this invention is explained. When performing ID registration to a receiver, an operator turns ON the registration switch 12 of the receiver 4 in drawing 3 first. In this state, a receiver 4 serves as ID registration mode, and display 14 displays ID storing position of RAM13a. ID storing position is set up to the number of ID which can be registered from 1, and is updated also sequentially from ID storing position 1 displayed on display. ID storing field is set as RAM13a, and the field for x (number of Registration ID) byte is usually (byte count of one-piece ID) set up into RAM13a.

[0014] Next, by pushing the shank of the air valve of the tire which it is going to register, an operator extracts the air inside a tire and changes a pressure. Since it detects that pressure variation has produced inside a tire the transmitter with which the interior of this tire is equipped by this operation, a transmitter transmits data to a receiver as unusual transmission immediately at the time. At this time, since it is unusual transmission, it will be transmitted by setting to 1 the pairing bit contained in transmit data.

[0015] If a receiver 4 receives the data with which the pairing bit was set up by the aforementioned unusual transmission as 1, a receiver 4 stores temporarily the identification number which received in ID storing position (interior of RAM13a) currently displayed on display 14. And ID storing position of a degree is displayed on display 14, and it waits for the data from the following transmitter. Since it is usually equipped with four tires in the case of the passenger car, the number of the registration ID required for a receiver 4 is also four. Therefore, it is possible for an operator to be the sequence of the sequence which will be registered by the time ID storing position displayed on display 14 is updated by 1, 2, 3, 4, and order, for example, a left-hand side front wheel, a left-hand side rear wheel, a right-hand side front wheel, a right-hand side rear wheel, etc., to push the valve core of each tire, to change the air pressure inside a tire, and to register. If reception of all four flowers is completed, a display will be 5 (END), will write in EEPROM13 which the same field has secured the receiving identification number till then stored in RAM13a at this time, and will complete registration.

[0016] When reception of four flowers is completed, the reason written in EEPROM is in the middle of registration work (that is, when reception of four flowers is not completed), and when an operator turns OFF a registration switch, it is for clearing the registration work till then. Next, the flow of registration control (S1) is explained using the flow chart of drawing 5. If a receiver 4 receives data, the registration switch 12 will judge first that it is the ON side (S2). And since it is not registration mode if it is the OFF side, initial setting of the ID storing position is carried out to 1, and it escapes from control (S11).

[0017] Since it is registration mode if the registration switch 12 is the ON side, that judgment to which the present ID storing position is not 5 is performed (S4). Since data reception of four flowers will already be completed and the registration to EEPROM will also be completed if ID storing position is 5, it escapes from control as it is (S11). It judges whether the pairing bit of the data received since it was

expected that there was a non-received transmitter after becoming registration mode when ID storing position was four or less is 1 (S5). Since it is data by which unusual transmission was carried out if a pairing bit is 1, it is necessary to store an identification number in RAM13a.

[0018] However, since it will become double storing if the already stored identification number exists, the identification number which received here judges that it is data [finishing / storing in RAM13a] (S6). And if it is an identification number [finishing / storing / already], it will escape from control, without storing (S11). The identification number which received if the same identification number was not stored in RAM13a is stored in ID storing position in the time (S7). And in order to show ID storing position of a degree, ID storing position is incremented (S8).

[0019] Consequently, since it means receiving the data from the transmitter with which each of the tire of four flowers is equipped when ID storing position is set to 5, four kinds of identification numbers stored in RAM13a are written in EEPROM13 (S10). The contents saved even if the power supply of a receiver 4 is intercepted, since EEPROM13 is non-volatile memory are not eliminated. ID registered into this EEPROM13 is called registration ID, and registration work is important work which determines the identification number which this receiver 4 recognizes. Only ID registered here recognizes a receiver 4. Even if it receives other ID, it is constituted so that it may ignore.

[0020] Since the number of ID to register has four tires 2 in the case of the usual passenger car, the number of ID which can be registered into EEPROM13 is also four. When four ID is registered, ID is written in EEPROM13 and registration work is completed because an operator turns OFF the registration switch 12 of a receiver 4. During registration work, as described above, the number is displayed on the display 14 by which ID storing position is connected to the receiver 4, and the present ID storing position can be visually shown to a registration operator.

[0021]

[Effect of the Invention] According to this invention, the work of ID registration can consider as ID registration mode by easy operation setup of a receiver as mentioned above by making it memorize to EEPROM which it has in the interior of a receiver as ID of a transmitter which should recognize ID which received during the ON of the registration switch of a receiver in the receiver. By moreover, the thing for which a pairing bit is changed to 1 from 0, and data are transmitted when the pressure data periodically measured by the pressure sensor inside a transmitter produce a predetermined pressure differential as compared with the pressure data measured immediately before Without a receiver's enabling it to recognize that it is transmission by pressure variation, and adding a circuit special to a transmitter side, special tools, such as a magnet, cannot be needed but compulsive transmission can be made to perform. Moreover, judgment of the data with which the data which the receiver side also received were usually transmitted, and the data by which unusual transmission was carried out can be performed. As conditions memorized to EEPROM which it has in the interior of a receiver as ID of the transmitter which should furthermore be recognized in a receiver By adding the conditions of the case where the pairing bit in the data is 1 further to the conditions of the data ID received during the ON of the registration switch of a receiver ID registration of arbitrary transmitters can be performed and the situation registered even if it receives the data usually transmitted by transmission into registration mode can be canceled. Moreover, the check of the registration work of an individual tire can carry out for registration operator itself. When the registration switch of a receiver is furthermore ON, it can judge which tire is equipped with the transmitter registered into ID registration position and its ID registration position by displaying ID registration position which it is going to register on display. That is, it turns out whether the identification number of the transmitter with which which tire is equipped was registered into the receiver as ID of what position. Thus, the practicality of this invention is very large.

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PRIOR ART

[Description of the Prior Art] the electromagnetism which changes with the pressure switch which detects a tire pressure, and these pressure switches -- the tire-pressure detection equipment detected by radio is proposed until now from the equipment which prepared the resonance circuit [-like] in the tire side, and prepared the resonance state of this resonance circuit in the body side And the monitor result of these inflation pressure force and the state of a pressure switch make judgment material the pressure information on the tire which is each making an individual identification number register into the receiver currently installed in in the car, and is needed decided beforehand.

[0003] For this reason, it is very important and ID registration work is in registering into a receiver side the identification number which can receive beforehand as the method ****. It is the method of bringing close the magnet proposed by JP,8-505939,A near the transmitter etc., forcible transmission was carried out, and ID registration was carried out by the receiver side. Moreover, in JP,9-210827,A, the transmitter ID of a tire-pressure alarm is learned and the method of updating Registration ID automatically is proposed.

[0004] Each of such conventional technology is the outstanding thought which can supervise the tire pressure under run by the radio signal, can catch reduction in a tire pressure a little early, and can send out an alarm to a driver's seat. However, a trouble is in the place where an inspection process becomes complicated, when conducting the manufacture assembly and inspection which were consistent on the production line of an automobile and an automobile is equipped with a tire-pressure alarm. That is, if the ready-for-receiving ability ID by the side of a receiver is decided beforehand, in accordance with a receiver, a transmitter wearing process will have to be prepared and it will become the cost rise by work man day increase.

[0005] Moreover, the method of enabling compulsive transmission from a transmitter and enabling re-registration of ID by the receiver side by the method of bringing a magnet close near the transmitter, must establish the element circuit for reacting to a magnet in the interior of a transmitter, and becomes the cost rise factor of a transmitter. Furthermore, this composition needs the magnet for carrying out forcible transmission.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The composition of the tire-pressure monitoring system of this invention is shown.

[Drawing 2] The transmitter block diagram of the tire-pressure monitoring system of this invention is shown.

[Drawing 3] The receiver block diagram of the tire-pressure monitoring system of this invention is shown.

[Drawing 4] The composition of the transmit data of this invention is shown.

[Drawing 5] The flows-of-control view of registration control of this invention is shown.

[Brief Description of Notations]

1 Vehicles

3 Transmitter

4 Receiver

5 Microcomputer

11 Microcomputer

12 Registration Switch

13 EEPROM

13aRAM

14 Display

[Translation done.]

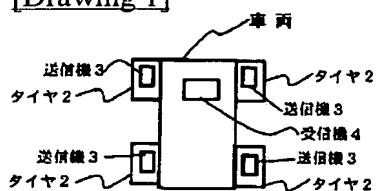
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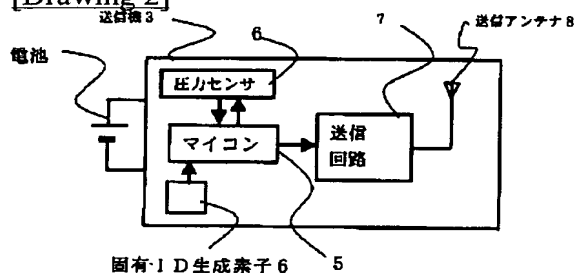
DRAWINGS

[Drawing 1]



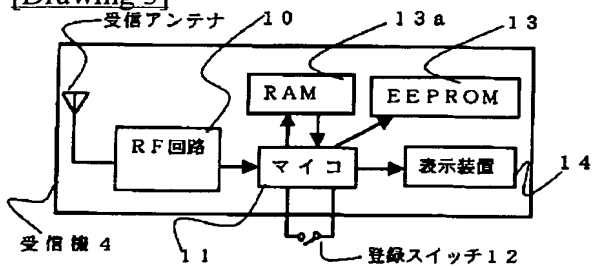
【図1】

[Drawing 2]



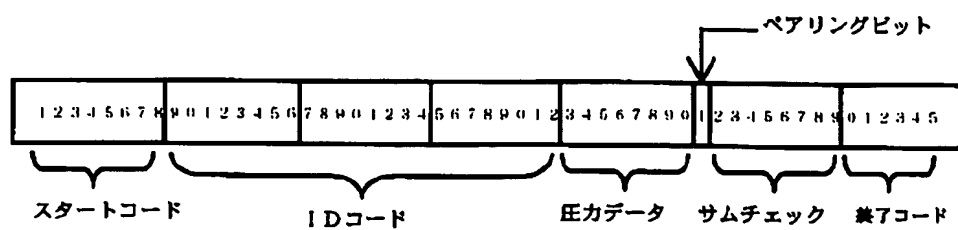
【図2】

[Drawing 3]



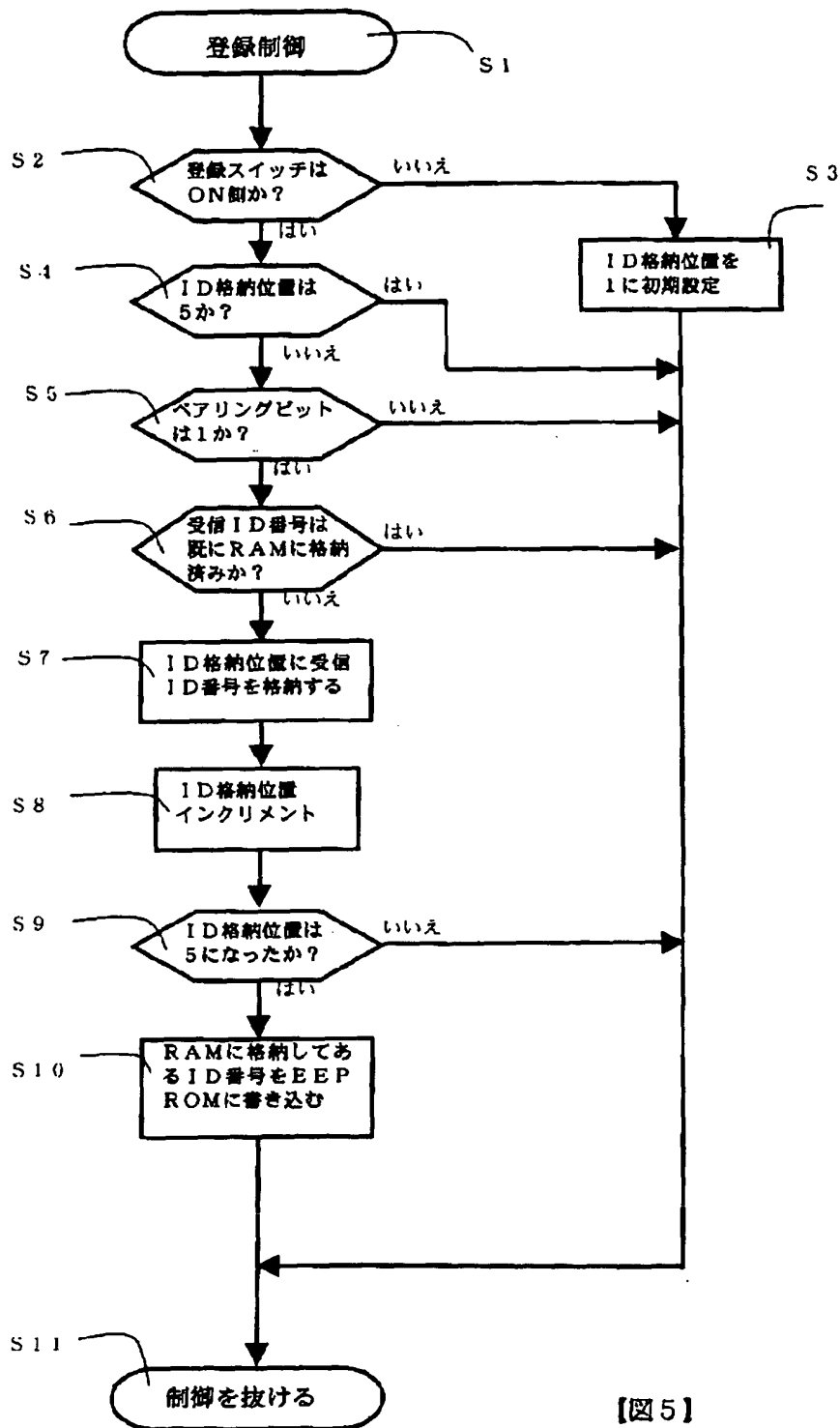
【図3】

[Drawing 4]



【圖 4】

[Drawing 5]



【図5】

[Translation done.]